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METRIC WEIGHTS AND MEASURES

AND

OTHER TABLES

PREPARED FOR THE USE OF

THE PHOTOGRAPHIC AND LITHOGRAPHIC OFFICES,
SURVEY OF INDIA,

UNDER THE DIRECTION OF

COLONEL H. R. THUILLIER, R.E.,
SURVEYOR GENERAL OF INDIA,

BY

COLONEL J. WATERHOUSE, B.S.C.,
ASSISTANT SURVEYOR GENERAL OF INDIA,

ASSISTED BY

W. H. COLE, Esq., M.A., AND T. ARCHDALE POPE, Esq.,
SURVEY OF INDIA.



CALCUTTA:

PRINTED BY THE SUPERINTENDENT OF GOVERNMENT PRINTING, INDIA.
1889.

The Photographic Society of Great Britain
per Col. Waterhouse -

07

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PREPARED FOR THE GOVERNMENT

THE PHOTOGRAPHIC AND ETHNOGRAPHIC SURVEY OF INDIA

BY THE DIRECTOR

COLONEL H. R. PHILLIPS

GOVERNMENT OF INDIA

BY

COLONEL J. A. HARRISON

ASSISTANT SURVEYOR GENERAL

AND

WILLIAM ELLIOTT, M.A., AND J. A. HARRISON, M.A.

EDITED BY

CALCUTTA

PRINTED BY THE GOVERNMENT OF INDIA

1880

METRIC WEIGHTS AND MEASURES

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SURVEY OF INDIA.

Metric Tables.

The metric system of weights and measures having been adopted in the Photographic Office for convenience in keeping the store accounts, the following tables for the conversion of these measures to British and *vice versa* will be found useful.

They have been based on the relative equivalents of the metric and British systems given in Schedule III of the Weights and Measures Act of 1878, and have been compiled from De la Rue's Tables and other sources.

As the metric system is now ordinarily used in scientific publications, the scope of the tables has been extended so as to meet, as far as possible, the ordinary requirements of general and scientific reference.

Use of the Tables.

The number required to be converted, whether British or metric, may either be multiplied directly by the decimal fraction representing the equivalent value of one unit of the required denomination, as found in the tables of equivalents or multipliers, according to the accuracy required; or, it may be broken up into a series of constituent parts in thousands, hundreds, tens, units and fractions, and the equivalents of the several amounts, as found from the tables of multipliers, added together. In the latter case care must be taken to change the position of the decimal point as required for multiples or fractions of the unit.

This will be best illustrated by examples.

Supposing it be desired to find the equivalent of 645·15 litres in pints.

By the first method 645·15 is multiplied by the equivalent of 1 litre in pints = 1·76077, giving a product of 1135·961.

By the second method the total number of litres may be broken up as follows :—

600·00 litres	=	1056·462 pints.
40·00 "	=	70·431 "
5·00 "	=	8·804 "
0·10 "	=	0·176 "
0·05 "	=	0·088 "
<u>645·15</u>		<u>1135·961</u>

Adding together the equivalents of the constituent parts in pints the same total is obtained.

Conversely :—Supposing it be desired to find the equivalent of 3 cwt. 25lb 14½ ounces in kilogrammes, the whole sum may be reduced to ounces and multiplied by ·02835, the equivalent of 1 ounce in kilogrammes, thus :—

$$5790·502 \times \cdot 02835 = 164·161 \text{ kilos.}$$

But in this case the result will be more accurately and simply obtained by finding the metric equivalents of the separate items of British measure from the tables, and adding them together, thus :—

3 cwt.	=	152·407 kilos.
20 lb	=	9·072 "
5 lb	=	2·268 "
10 oz.	=	0·283 "
4 oz.	=	0·113 "
0·5 oz.	=	0·014 "
<u>TOTAL</u>		<u>164·157 "</u>

In some cases the first method will be the simplest and in others the second. The tables of multipliers show only 3 places of decimals, and therefore, if greater accuracy be required, especially in the first method, a longer fraction of at least 5 places of decimals should be taken from the tables of equivalents.

NOTE.—The value of the metre given in the Table I = 39·37079 inches, *in vacuo*, at Sea-level, was determined by Captain Kater in 1818, the temperature of the standard yard being 62° F. and of the metre 32° F. It has since then been recognised as the authoritative legal equivalent of the metre in British measure and still remains so.

In the course of his comparison of the standards of length of various countries, made at the Ordnance Survey Office, Southampton, in 1865, Captain A. R. Clarke, R.E., determined the true length of the legal equivalent of the metre under the above conditions of temperature to be 1·09362311 yards = 3·28086933 feet = 39·37043196 inches (see "Comparison of the Standards of Length," p. 280).

By this valuation the corresponding equivalents of British Measures of Length in Metric Measures are :—

1 inch	=	2·5399772 centimetres,
1 foot	=	30·4797264 "
1 yard	=	91·4391792 "
1 mile	=	1·6093296 kilometre

(as given in the Survey of India 'Auxiliary Tables').

Captain Clarke further determined the correct British equivalent of the *Scientific* metre or the length of the ideal theoretical metre, being the 10-millionth part of the quadrant of the Meridian passing through Paris, to be 39'377786 inches, or, reduced to the same standard of temperature as the legal metre, 39'376229 inches.

As stated above, in fixing the equivalent of the legal metre, the lengths of the standards were compared at their normal temperature, *viz.*, 32° for the metre and 62° F. for the standard yard. The Standards Commissioners recommended in 1871 that, for *commercial* purposes, it was desirable that the comparison of the two standards should be made at the same ordinary temperature of the air at 62° F. According to this valuation the length of a brass metre would be 39'380203 inches.

Table II is based on the determination by Prof. W. H. Miller, in 1844, of the weight of the French *Kilogramme des Archives*, in *vacuo*, to be equal to 15432'34874 imperial grains, or 2'20462125 standard platinum pounds (avoirdupois).

The Troy pound has now almost become obsolete. Under the Weights and Measures Act of 1878, avoirdupois weight is to be used exclusively for all articles sold by weight, except for bullion and precious stones, which may be sold by the Troy ounce or by decimal parts of it, and for drugs which may be sold by retail by apothecaries' weight. In the latest editions of the British Pharmacopoeia the only weights used are the grain, avoirdupois ounce (437'5 grains) and pound (7000 grains). Photographic and chemical formulæ are commonly prepared according to Apothecaries or Troy grains, drachms and ounces, but the use of Avoirdupois and Metric Weights for this purpose is fast extending.

The tables have been carefully revised in the Trigonometrical Branch office by Mr. W. H. Colle, M.A., Deputy Superintendent of Survey.

I.—Measures

Metric to

The fundamental unit of Metric Length and Weight is the METRE, assumed to be the 10-standard metre at its normal temperature of 32° F. is 39'37079

		Inches.	Feet.	Yards.
Millimetre	= $\frac{1}{1000}$ metre	= 0'03937	0 00325	0'00109
Centimetre	= $\frac{1}{100}$ "	= 0'39371	0 03281	0'01094
Decimetre	= $\frac{1}{10}$ "	= 3'93708	0 32800	0'10936
METRE	= unit	= 39'37079	3 28090	1'09363
Decametre	= 10 metres	= 393'70790	32 80899	10 93633
Hectometre	= 100 "	= 3,937'07900	328 08992	109 36331
Kilometre	= 1,000 "	= 39,370'79000	3,280 89917	1,093 63306
Myriametre	= 10,000 "	= 393,707'90000	32,808 99167	10,936 33056

One Micron (μ .) (p'. micra), = one-thousandth of a millimetre = '001 millimetre = '000039 inch.

MULTI

	Metres.	Millimetres to Inches.	Feet.		Metres.	Centimetres to Inches.	Feet.
1	0'001	0'03937	0'00328	0'01	0'3937	0'0328	0'0328
2	0'002	0'07874	0'00656	0'02	0'7874	0'0656	0'0656
3	0'003	0'11811	0'00984	0'03	1'1811	0'0984	0'0984
4	0'004	0'15748	0'01312	0'04	1'5748	0'1312	0'1312
5	0'005	0'19685	0'01640	0'05	1'9685	0'1640	0'1640
6	0'006	0'23622	0'01969	0'06	2'3622	0'1969	0'1969
7	0'007	0'27560	0'02297	0'07	2'7560	0'2297	0'2297
8	0'008	0'31497	0'02625	0'08	3'1497	0'2625	0'2625
9	0'009	0'35434	0'02953	0'09	3 5434	0'2953	0'2953
10	0'010	0'39371	0'03281	0'10	3'9371	0 3281	0 3281

British to

		Millimetres.	Centimetres.
12 inches	= 1 inch	= 25'39954	2'53995
3 feet	= 1 foot	= 304'79449	30'47945
2 yards	= 1 yard	= 914'38348	91'43835
5½ "	= 1 fathom	= 1,828'76696	182'87635
40 "	= 1 pole or perch	= 5,029'10914	502'91091
40 poles	= 1 furlong	= 201,164'36576	20,116'43658
8 furlongs	= 1 mile	= 1,609,314'92612	160,931'49261

1 chain = 20'11644 Metres, 1 Geographical mile = 1'1527 Statute miles = 1,855'052 metres. 1 degree = 1 mil = $\frac{1}{1000}$ inch = '0154 m.m.

MULTI

	Millimetres.	Inches to Centimetres.	Decimetres.	Centimetres.	Feet to Decimetres.	Metres.
1	25'3995	2'54	0'254	30'479	3'048	0'305
2	50'7991	5'08	0'508	60'957	6'096	0'610
3	76'1986	7'62	0'762	91'438	9'144	0'914
4	101'5982	10'16	1'016	121'918	12'192	1'219
5	126'9977	12'70	1'270	152'397	15'240	1'524
6	152'3972	15'24	1'524	182'876	18'288	1'829
7	177'7968	17'78	1'778	213'356	21'336	2'134
8	203'1963	20'32	2'032	243'835	24'384	2'438
9	228'5959	22'86	2'286	274'315	27'432	2'743
10	253'9954	25'40	2'540	304'794	30'479	3'048

1 inch = 25,399'54 micra, $\frac{1}{100}$ inch = 253'995 micra.

Fractions of an Inch to Millimetres.

$\frac{1}{16}$ = 12'6998	$\frac{1}{8}$ = 5'0799	$\frac{1}{4}$ = 2'5400	$\frac{1}{2}$ = 0'8467
$\frac{3}{16}$ = 8'4665	$\frac{5}{16}$ = 4'2333	$\frac{3}{8}$ = 2'1166	$\frac{5}{8}$ = 0'7937
$\frac{1}{2}$ = 16'9330	$\frac{7}{8}$ = 3'6285	$\frac{1}{2}$ = 1'5775	$\frac{3}{4}$ = 0'6350
$\frac{5}{8}$ = 6'3499	$\frac{15}{16}$ = 3'1749	$\frac{15}{16}$ = 1'2700	$\frac{7}{8}$ = 0'5080
$\frac{3}{4}$ = 19'0497	$\frac{15}{8}$ = 2'8222	$\frac{1}{2}$ = 1'0160	$\frac{1}{2}$ = 0'2540

of Length.

British.

millionth part of the quarter of the earth's meridian. The legal British equivalent of the inches, of the British standard yard at the temperature of 62° F.

Furlongs.	Miles.	Miles.	Furlongs.	Yards.	Feet.	Inches.
...	...	= 0	0	0	0	about $\frac{1}{36}$
0'00005	...	= 0	0	0	0	" $3\frac{1}{10}$
0'00050	0'00005	= 0	0	1	0	" $3\frac{1}{5}$
0'00497	0'00052	= 0	0	10	2	" $9\frac{1}{10}$
0'04971	0'00521	= 0	0	109	1	" $1\frac{1}{2}$
0'49711	0'05214	= 0	0	213	1	" $10\frac{1}{2}$
4'97105	0'52138	= 0	4	156	0	" $11\frac{1}{10}$
49'71059	5'21382	= 6	1			

One micro-millimetre ($\mu\mu$) = one-millionth of a millimetre or about 0'0000004 of an inch.

PLIERS.

Inches.	Metres to Feet.	Yards.	Feet.	Kilometres to Yards.	Miles.	
39'371	3'281	1'094	3,280'899	1,093'633	0'621	1
78'742	6'562	2'187	6,561'798	2,187'266	1'243	2
118'112	9'843	3'281	9,842'697	3,280'899	1'864	3
157'483	13'124	4'375	13,123'597	4,374'532	2'486	4
196'854	16'404	5'468	16,404'496	5,468'165	3'107	5
235'225	19'685	6'562	19,685'295	6,561'798	3'728	6
275'596	22'966	7'655	22,966'294	7,655'431	4'350	7
314'966	26'247	8'749	26,247'193	8,749'064	4'971	8
354'337	29'528	9'843	29,528'092	9,842'697	5'592	9
393'708	32'809	10'936	32,808'992	10,936'331	6'214	10

Metric.

Decimetres.	Metres.	Hectometres.	Kilometres.
0'25400	0'02540	0'00025	0'00003
3'04704	0'30479	0'00305	0'00030
9'14383	0'91438	0'00914	0'00091
18'28767	1'82877	0'01829	0'00183
50'29100	5'02911	0'05029	0'00503
20'1164366	20'116437	2'01164	0'20116
16,093'14926	1,609'31493	16'09315	1'60931

111'303 kilometres. The length of 1' of latitude at 45° = 6,076 feet = 1'1508 Statute mile = 1852 metres, nearly.
1 line = $\frac{1}{16}$ inch = 2'1156 mm.

PLIERS.

Decimetres.	Yards to Metres.	Kilometres.	Metres.	Miles to Hectometres.	Kilometres.	
9'1438	0'914	0'0009	1,609'315	16'093	1'609	1
18'2877	1'829	0'0018	3,218'630	32'186	3'219	2
27'4315	2'743	0'0027	4,827'945	48'279	4'828	3
36'5753	3'658	0'0037	6,437'260	64'373	6'437	4
45'7192	4'572	0'0046	8,046'575	80'466	8'047	5
54'8630	5'486	0'0055	9,655'890	96'559	9'656	6
64'0068	6'401	0'0064	11,265'204	112'652	11'265	7
73'1507	7'315	0'0073	12,874'519	128'745	12'875	8
82'2945	8'229	0'0082	14,483'834	144'838	14'484	9
91'4383	9'144	0'0091	16,093'149	160'931	16'393	10

Approximate Values.

1 kilometre	= about 5 furlongs ('039 less)	1 mile	= nearly $1\frac{1}{8}$ kilometre (1% less).
1 metre	= " 39 $\frac{1}{4}$ inches ('029" less)	1 yard	= " $\frac{1}{3}$ metre. 11 Metres = 12 yards.
To convert metres to yards add $\frac{1}{11}$			
1 Decimetre	= 4 inches (3 $\frac{1}{8}$ exactly)	1 foot	= " 30 $\frac{1}{2}$ centimetres.
1 Centimetre	= $\frac{1}{2}$ inch	1 inch	= " 2 $\frac{1}{2}$ "
1 Millimetre	= $\frac{1}{25}$ "	1 "	= " 25 $\frac{1}{2}$ millimetres

II.—Measures

Metric to British Avoir

The standard unit of Metric Weight is the KILOGRAMME, which is the weight of a

	Grammes,	Grains,	Troy Ounces, (480 grains.)	Avoirdupois Ounces, (437.5 grains.)
Milligramme	= $\frac{1}{1000}$ =	0.01543	0.0003	0.0003
Centigramme	= $\frac{1}{100}$ =	0.15432	0.0032	0.0035
Decigramme	= $\frac{1}{10}$ =	1.54323	0.0322	0.0353
GRAMME	= 1 =	15.43235	0.3215	0.0357
Decagramme	= 10 =	154.32349	3.2151	0.35274
Hectogramme	= 100 =	1,543.23487	32.1507	3.52739
KILOGRAMME	= 1,000 =	15,432.34874	321.5073	35.27394
Myriagramme	= 10,000 =	154,323.48740	3215.0727	352.73940
Quintal	=	100 Kilogrammes	1.96841 Cwt.	0.09842 Tons
Millier or Tonne	=	1000 "	19.68412 "	0.98421 "

MULTI

	Milligrammes to Grains.	Centigrammes to Grains.	Decigrammes to Grains.	Grammes to Grains.	Ap. Drachms.	Troy oz.	Avoir. oz.
1	0.0154	0.154	1.543	15.432	0.2572	0.032	0.035
2	0.0309	0.309	3.086	30.865	0.5144	0.064	0.071
3	0.0463	0.463	4.630	46.297	0.7716	0.096	0.106
4	0.0617	0.617	6.173	61.729	1.0288	0.129	0.141
5	0.0772	0.772	7.716	77.162	1.2860	0.161	0.176
6	0.0926	0.926	9.259	92.594	1.5432	0.193	0.212
7	0.1080	1.080	10.803	108.026	1.8004	0.225	0.247
8	0.1235	1.235	12.346	123.459	2.0576	0.257	0.282
9	0.1389	1.389	13.889	138.891	2.3149	0.289	0.318
10	0.1543	1.543	15.432	154.323	2.5721	0.322	0.353

British Troy and

	Grains	Milligrammes,	Centigrammes,	Decigrammes,
Grain	=	64.79895	6.47990	0.64799
Scruple (A)	= 20 Grains	1,295.97901	129.59790	12.95979
Pennyweight (T)	= 24 "	1,555.17481	155.51748	15.55175
Drachm (A)	= 60 "	3,887.93702	388.79370	38.87937
Ounce	= 480 "	31,103.49617	3,110.34962	311.03496
Pound	= 5,760 "	373,241.95410	37,324.19541	3,732.41954

In the new British Pharmacopœia the Avoirdupois Ounce and

Avoirdupois

	Grains	Milligrammes,	Centigrammes,	Decigrammes,
Dram	= 27.34 Grains	1,771.84630	177.18463	17.71846
Ounce	= 437.5 "	28,349.54078	2,834.95408	283.49541
Pound	= 7,000 "	453,592.65455	45,359.26545	4,535.92653
Stone	= 14 lb "	...	...	...
Hundredweight	= 112 "	...	...	...
Ton	= 2,240 "	...	...	...

MULTI

	Grains to Milligrams.	Grms.	Decigrams.	Grms.	Decigrams.	Grms.	Hectograms.	Kilograms.
1	64.799	6.480	0.648	3.888	0.389	31.103	0.311	0.031
2	129.598	12.960	1.296	7.776	0.778	62.207	0.622	0.062
3	194.397	19.440	1.944	11.664	1.166	93.310	0.933	0.093
4	259.196	25.920	2.592	15.552	1.555	124.414	1.244	0.124
5	323.995	32.399	3.240	19.440	1.944	155.517	1.555	0.156
6	388.794	38.879	3.889	23.328	2.333	186.621	1.866	0.187
7	453.593	45.359	4.536	27.216	2.722	217.724	2.177	0.218
8	518.392	51.839	5.184	31.103	3.110	248.828	2.488	0.249
9	583.190	58.319	5.833	34.991	3.499	279.931	2.799	0.280
10	647.990	64.799	6.480	38.879	3.888	311.035	3.110	0.311

Fractions of a Grain to Milligrammes.

$\frac{1}{2}$ = 32.4	$\frac{1}{4}$ = 16.2	$\frac{1}{8}$ = 8.1	$\frac{1}{16}$ = 4.05
$\frac{1}{32}$ = 2.025	$\frac{1}{64}$ = 1.0125	$\frac{1}{128}$ = 0.50625	$\frac{1}{256}$ = 0.253125
$\frac{1}{512}$ = 0.1265625	$\frac{1}{1024}$ = 0.06328125	$\frac{1}{2048}$ = 0.031640625	$\frac{1}{4096}$ = 0.0158203125
$\frac{1}{8192}$ = 0.001220703125	$\frac{1}{16384}$ = 0.0006103515625	$\frac{1}{32768}$ = 0.00030517578125	$\frac{1}{65536}$ = 0.000152587890625

of Weight.

dupois and Troy.

cubic decimetre, or 61·027 cubic inches, of pure water, in vacuo, at 4° C. (39·2° F.).

Avoirdupois Pounds. (7000 grains.)	Hundredweights. (112 lbs. Av.)	Avoirdupois. lbs. oz. grs.	nearly.	Troy and Apothecaries. lbs. oz. dr. grs.
...	...	= 0 0 0		0 0 0 0
0'00002	...	= 0 0 0		0 0 0 0
0'00022	...	= 0 0 0		0 0 0 0
0'00220	0'00002	= 0 0 0	15 $\frac{1}{2}$	0 0 0 0
0'02205	0'00020	= 0 0 0	154 $\frac{1}{8}$	0 0 0 2
0'22046	0'00197	= 0 3 230 $\frac{1}{8}$	8·818	0 3 1 432
2'20462	0'01968	= 2 3 119 $\frac{1}{8}$		2 8 1 12 $\frac{1}{2}$
22'04621	0'19684	= 22 0 323 $\frac{1}{8}$		26 9 4 3 $\frac{1}{2}$

= weight of 1 cubic metre of water.

PLIERS.

Hectogrammes to Troy oz.	Avoirdupois. Avoir. lbs.	Kilogrammes to Troy oz.	Avoirdupois. Avoir. lbs.	Quintals to Hundredweights.	Milliers to Tons.
3'215	3'527	32'151	35'274	1'068	0'984
6'430	7'055	64'301	70'548	3'937	1'968
9'645	10'582	96'452	105'822	5'905	2'953
12'860	14'110	128'603	141'096	7'874	3'937
16'075	17'637	160'754	176'370	9'842	4'921
19'290	21'164	192'904	211'644	11'810	5'905
22'506	24'692	225'055	246'918	13'779	6'889
25'721	28'219	257'206	282'192	15'747	7'874
28'936	31'747	289'357	317'465	17'716	8'858
32'151	35'274	321'507	352'739	19'684	9'842

Apothecaries Weight to Metric.

Grammes.	Decagrammes.	Hectogrammes.	Kilogrammes.
0'06480	0'00648	0'00065	0'00006
1'29598	0'12960	0'01296	0'00130
1'55517	0'15552	0'01555	0'00156
3'88794	0'38879	0'03888	0'00389
31'10350	3'11035	0'31103	0'03110
373'24195	37'32420	3'73242	0'37324

Pound and the ordinary Grain are the only weights adopted.

to Metric.

Grammes.	Decagrammes.	Hectogrammes.	Kilogrammes.
1'77185	0'17718	0'01772	0'00177
28'34954	2'83495	0'28350	0'02835
453'59265	45'35927	4'53593	0'45359
6,350'29714	635'02971	63'50297	6'35030
50,802'37709	5,080'23771	508'02377	50'80238
1,016,047'54170	101,604'75417	1,0160'47542	1,016'04754

PLIERS.

Avoirdupois Ounces to Grms.	Hectogrammes. to Kilograms.	Avoirdupois Pounds to Hectograms.	Kilograms.	Hundredweights to Quintals.	Tons to Milliers.
28'350	0'283	453'593	4'536	0'508	1'016
56'699	0'567	907'185	9'072	1'016	2'032
85'049	0'850	1360'778	13'608	1'524	3'048
113'398	1'134	1814'571	18'144	2'032	4'064
141'748	1'417	2267'963	22'680	2'540	5'080
170'097	1'701	2721'556	27'216	3'048	6'096
198'447	1'984	3175'149	31'751	3'556	7'112
226'796	2'268	3628'741	36'287	4'064	8'128
255'146	2'551	4082'334	40'823	4'572	9'144
283'495	2'835	4535'927	45'359	5'080	10'160

Approximate Equivalents.

1,000 Kilogrammes or Metric Tonne is nearly 1 English Ton (about 1 $\frac{1}{4}$ % less).

1 Kilogramme equals weight of cubic decimetre or litre of water.

is nearly 2 $\frac{1}{2}$ lb. Avoirdupois (about 1% more); 5 Kilos. = 11lb. nearly.

1 Hectogramme is about 3 $\frac{1}{2}$ ounces Avoirdupois.

1 Decagramme is about $\frac{1}{4}$ ounce.

1 Gramme is about 15 $\frac{1}{2}$ grains.

65 Milligrammes are about 1 grain.

1 Hundredweight is nearly 51 Kilos. (about 2% less).

1 ounce Troy = 31 $\frac{1}{8}$ grammes } The ounce is commonly and conveniently taken as 30 grammes in making up

1 ounce Avoirdupois = 28 $\frac{3}{8}$ grammes } photographic formulae,

1 Drachm = 4 grammes nearly (about 1 $\frac{1}{4}$ grains less).

III.—Measures of

Metric

The Unit of Metric Measures of Capacity is the LITRE, or Cubic Decimetre, equal to the

	Litres.	Cubic Inches.	Cubic Feet.	Fluid, Oz. 1'73496 Cub. Ins.
Millilitre or cubic centimetre	= $\frac{1}{1000}$	0'06103	0'00004	0'03522
Centilitre = 10 cubic cents	= $\frac{1}{100}$	0'61027	0'00035	0'35215
Decilitre = 100 " "	= $\frac{1}{10}$	6'10271	0'00353	3'52155
LITRE or cubic Decimetre	= 1	61'02705	0'03532	35'21547
Decalitre	= 10	610'27052	0'35317	352'15468
Hectolitre	= 100	6'102'70515	3'53166	3'521'54683
Kilolitre (cubic metre)	= 1,000	61'027'05152	35'31658	35'215'46828
Myrialitre	= 10,000	610'270'51519	353'16581	352'154'68280

N.B.—The above Table is based upon the value of the Litre as given in the Weights and Measures Act of 1878 = 0'2202443 Imperial gallons. Under this valuation the Litre = 35'23909 fluid ounces

MULTI

	Minims.	Millilitres to Fl. Drachms.	Fl. Oz.	Centilitres to Fl. Onnces.	Fl. Onnces to Pints.	Pints.
1	16'903	0'282	0'035	2'817	0'352	0'176
2	33'807	0'563	0'070	5'634	0'704	0'352
3	50'710	0'845	0'105	8'452	1'056	0'528
4	67'614	1'127	0'141	11'269	1'409	0'704
5	84'517	1'409	0'176	14'086	1'761	0'880
6	101'421	1'690	0'211	16'903	2'113	1'056
7	118'324	1'972	0'247	19'721	2'465	1'233
8	135'227	2'254	0'282	22'538	2'817	1'409
9	152'131	2'536	0'317	25'355	3'169	1'585
10	169'034	2'817	0'352	28'172	3'522	1'761

British

	Minim	Millilitres or cubic centimetres,	Centilitres.
Drachm	= 60 minims	= 0'05916	0'0592
Fluid ounce	= 8 Fl. drachms	= 3'54058	0'35496
Pint	= 20 Fl. ounces	= 28'39661	2'83966
Quart	= 40 " "	= 56'79322	5'67932
Gallon	= 160 " "	= 113'58649	11'35865
		= 4'543'45797	454'34580

According to the corrected value of the Litre, as above, 1 pint = '56755

MULTI

	Minims to Millilitres.	Fl. Drachms to Millilitres.	Millilitres.	Fluid Onnces to Decilitres.	Litres.
1	= 0'059	15 = 0'887	1 = 3'550	28'397	0'028
2	= 0'118	20 = 1'183	2 = 7'099	56'793	0'057
3	= 0'177	25 = 1'479	3 = 10'649	85'190	0'085
4	= 0'237	30 = 1'775	4 = 14'198	113'586	0'114
5	= 0'296	35 = 2'071	5 = 17'748	141'983	0'142
6	= 0'355	40 = 2'366	6 = 21'297	170'380	0'170
7	= 0'414	45 = 2'662	7 = 24'847	198'776	0'199
8	= 0'473	50 = 2'958	8 = 28'397	227'173	0'227
9	= 0'532	55 = 3'254	9 = 31'946	255'570	0'256
10	= 0'592	60 = 3'550	10 = 35'496	283'966	0'284

Useful Data.

- 1 Minim is the measure of 0'91146 grains of water.
 1 Fluid drachm = 54'6875 " "
 1 Fluid ounce = 437'5 " " = 1 ounce avoirdupois.
 1 Pint = 1'25 lb or 8750 " " = 34'65923 cubic inches.
 1 Gallon = 10 lb or 70,000 " " = 277'27384 " "
 Cubic feet \times 6'2321 = gallons.
 Gallons \times '16046 = cubic feet.
 Litres \times '03532 = " " Litres \times '220 = gallons.
 1 Cubic inch of distilled water at 62° F., Bar. 30 ins. = 252'458 grains = '0361 lb = 16'386176 cubic cent.
 1 Cubic foot of water = 62'321 lb = 6'2321 gallons = 28'315312 litres.
 1 Ton of water = 35'9 cubic feet.

Capacity (Fluid).

to British.

weight of 1,000 grammes of pure water, at a temperature of 4° C. (39° 2° F.).

Pints. 34'65923 Cub. Ins.	Gallons. 277'27384 Cub. Ins.	Gallons.	Pints.	Fl. Oz.	Fl. Drachms.	Minims.
= 0'00176	0'00022	= 0	0	0	0	16'9034
= 0'01761	0'00201	= 0	0	0	2	49'03
= 0'17608	0'02201	= 0	0	3	4	10'34
= 1'76077	0'22010	= 0	1	15	1	43'43
= 17'60773	2'20097	= 2	1	12	1	13'44
= 176'07734	22'00967	= 22	0	1	4	22'47
= 1,760'77341	220'09668	= 220	0	15	3	44'56
= 17,607'73414	2,200'96677	= 2,200	7	14	5	28'94

1'76077 pints or 0'22009668 gallon. More accurate determination shows that the correct equivalent is 1'761954 pints, or the Millilitre = '281913 fluid drachms = 16'91476 minims. The practical difference is trifling.

PLIERS.

Fl. Ounces.	Litres to Pints.	Gallons.	Decalitres to Quarts.	Gallons.	Kilolitres to Gallons.	
35'215	1'761	0'220	8'804	2'201	220'097	1
70'431	3'522	0'440	17'608	4'402	440'193	2
105'646	5'282	0'660	26'412	6'603	660'290	3
140'862	7'043	0'880	35'215	8'804	880'387	4
176'077	8'804	1'100	44'019	11'005	1,100'483	5
211'293	10'565	1'321	52'823	13'206	1,320'580	6
246'508	12'325	1'541	61'627	15'407	1,540'677	7
281'724	14'086	1'761	70'431	17'608	1,760'773	8
316'939	15'847	1'981	79'235	19'809	1,980'870	9
352'155	17'608	2'201	88'039	22'010	2,200'967	10

to Metric.

Decilitres.	Litres.	Decalitres.	Kilolitres.
0'00059	0'00006	0'00001	...
0'03550	0'00355	0'00035	...
0'28397	0'02840	0'00284	0'000028
5'67932	0'56793	0'05679	0'000568
11'35864	1'13586	0'11359	0'001136
45'43458	4'54346	0'45435	0'004543

Litre. 1 fluid ounce = 28'377 C. C. 1 fluid drachm = 3'547 C. C. 1 minim = 0'5911 C. C.

PLIERS.

Millilitres.	Pints to Decilitres.	Litres.	Quarts to Litres.	Gallons to Litres.	
567'932	5'679	0'568	1'136	4'543	1
1,135'864	11'359	1'136	2'272	9'087	2
1,703'797	17'038	1'704	3'408	13'630	3
2,271'729	22'717	2'272	4'543	18'174	4
2,839'661	28'397	2'840	5'679	22'717	5
3,407'593	34'076	3'408	6'815	27'261	6
3,975'526	39'755	3'976	7'951	31'804	7
4,543'458	45'435	4'543	9'087	36'348	8
5,111'390	51'114	5'111	10'223	40'891	9
5,679'322	56'793	5'679	11'359	45'435	10

Approximate values.

- 1 Millilitre or cubic centimetre is 17 minims nearly.
- 1 Centilitre is about 2 drachms 49 minims.
- 1 Decilitre is about 3½ ounces.
- 1 Litre is about 35½ fluid ounces, or rather more than 1½ pint.
- 1 Kilolitre or cubic metre holds nearly one ton of water 62° F.
- 1 Fluid drachm is rather more than 3½ cubic centimetres (1½% more).
- 1 Fluid ounce is about 28½ cubic centimetres.
- 1 Pint is about 568 cubic centimetres.
- 1 Quart is rather more than 1½ litres.
- 1 Gallon is about 4½ litres (1% more).

IV.--Cubic

The unit of Metric Measurement is the STERE, or CUBIC METRE, weighing

Metric to

		Cubic Metre.
Cubic Millimetre	= 1,000 Cubic millim.	= 0'0000001
Cubic Centimetre	= 1,000 " centim.	= 0'0001
Millistere (cubic decim.)	= 10 " decim.	= 0'001
Centistere	= 100 " "	= 0'01
Decistere	= 1,000 " "	= 0'1
STERE (cubic metre)	= 10 " metres.	= 1
Decastere	= 100 " "	= 10
Hectostere		= 100

NOTE.—The Stere is more generally used for measuring timber, wood-work, or firewood.

MULTI

	Cubic Centimetres to Cubic Inches.	Cubic Decimetres to Cubic Inches.	Cubic Feet.
1	0'051	61'027	0'035
	0'122	122'054	0'071
3	0'183	183'081	0'106
4	0'244	244'108	0'141
5	0'305	305'135	0'177
6	0'366	366'162	0'212
7	0'427	427'189	0'247
	0'488	488'216	0'283
9	0'549	549'243	0'318
10	0'610	610'271	0'353

British to

	Cubic Inches.	Cubic Feet.	Cubic Yards.
Cubic inch	= 1	= 0'0005787	0'00002143
Cubic foot	= 1,728	= 1'00	0'03704
Cubic yard	= 46,656	= 27'00	1'00

MULTI

	Cubic Inches to Cubic Centimetres.	Cubic Feet to Cubic Decimetres.	Cubic Metres.
1	16'386	28'315	0'028
2	32'772	56'631	0'057
3	49'159	84'946	0'085
4	65'545	113'261	0'113
5	81'931	141'577	0'142
6	98'317	169'892	0'170
7	114'703	198'207	0'198
8	131'089	226'522	0'227
9	147'476	254'838	0'255
10	163'862	283'153	0'283

Approximate

- 1 cubic metre is nearly $1\frac{1}{4}$ cubic yard ($1\frac{1}{4}\%$ less).
 1 " " is nearly $35\frac{1}{2}$ cubic feet (05% less).
 10 cubic metres equal 13 cubic yards.
 1 cubic yard is about $\frac{2}{3}$ cubic metre (2% more).
 1 cubic foot is about $28\frac{1}{2}$ cubic decimetres (0.18 less).

NOTE.—To reduce cubic metres to cubic decimetres or cubic centimetres, which are all multiples of 1,000, the decimal to convert cubic metres into cubic decimetres or cubic hectometres the decimal point is removed 3 places at a time to the

Measures.

1 Millier, or 1,000 Kilogrammes, of pure water, at 4° C. (39° 2' F.).

British.

Cubic Inches.	Cubic Feet.	Cubic Yards.
0'000051	0'0000003	.....
0'061027	0'000353	0'000001
61'027052	0'035317	0'001308
610'270515	0'353166	0'013080
6102'705152	3'531658	0'130802
61027'051519	35'316581	1'308022
610270'515194	353'165807	13'080215
.....	3531'658074	130'802151

The Centistere, Decistere, Decastere, and Hectostere are not cubic measures but only measures of volume.

PLIERS.

Cubic Feet.	Cubic Metres to	Cubic Yards.	
35'317		1'308	1
70'633		2'616	2
105'950		3'924	3
141'266		5'232	4
176'583		6'540	5
211'899		7'848	6
247'216		9'156	7
282'533		10'464	8
317'849		11'772	9
353'166		13'080	10

Metric.

Cubic Centimetres.	Cubic Decimetres.	Cubic Metres.
= 16'386176	0'016386	0'000016
= 28315'311931	28'315312	0'028315
= 764513'422137	764'513422	0'764513

PLIERS.

Cubic Decimetres.	Cubic Yards to	Cubic Metres.	
764'513		0'765	1
1529'027		1'529	2
2293'540		2'294	3
3058'054		3'058	4
3822'567		3'823	5
4587'080		4'587	6
5351'594		5'352	7
6116'107		6'116	8
6880'621		6'881	9
7645'134		7'645	10

Values.

- 1 cubic inch is about 16 $\frac{3}{4}$ cubic centimetres (0'014 less).
- 1 cubic metre is the cube of nearly 39 $\frac{1}{2}$ inches (135'9 cubic inches less).
- 1 cubic decimetre is the cube of nearly 4 inches (3 cubic inches less).
- 1 cubic centimetre is the cube of nearly $\frac{1}{16}$ inch (0'00097 cubic inches less).
- 1 cubic millimetre is the cube of nearly $\frac{1}{16}$ inch (0'00003 cubic inches less).

point must be removed 3 places at a time to the right, instead of one, as the denomination would seem to imply. Similarly left.

V.—Square

Metric to

The Unit of Metric Measurement for Land Measure

Square Millimetre	= $\frac{1}{1000000}$ Sq. Metre.	= $\frac{1}{100}$ Sq. centim.	Sq. Inches,	Sq. Feet,
Square Centimetre	= $\frac{1}{10000}$ " "	= $\frac{1}{100}$ " decim.	= 0'00155	0'00001
Square Decimetre	= $\frac{1}{100}$ " "		= 0'15501	0'00108
Square Metre, or Centiare	= 1 " "		= 15'50059	0'10764
ARE	= 100 Sq. Metres,		= 1,550'05911	10'76430
Hectare	= 10,000 " "		= 155,005'91052	1,076'42993
			= ...	107,642'99341

MULTI

	Square Millims. to Sq. Inches.	Square Centimetres to Sq. Inches. Sq. Feet.	Square Decimetres to Sq. Inches. Sq. Feet.	Sq. Yards.
1	0'002	0'155 0'001	15'501 0'108	0'013
2	0'003	0'310 0'002	31'001 0'215	0'024
3	0'005	0'465 0'003	46'502 0'323	0'036
4	0'006	0'620 0'004	62'002 0'431	0'048
5	0'008	0'775 0'005	77'503 0'538	0'060
6	0'009	0'930 0'006	93'004 0'646	0'072
7	0'011	1'085 0'008	108'504 0'753	0'084
8	0'012	1'240 0'009	124'005 0'861	0'096
9	0'014	1'395 0'010	139'505 0'969	0'108
10	0'016	1'550 0'011	155'006 1'076	0'120

British

	Square Inches	Square Millimetres,	Square Centimetres,
Square Inch	= ...	= 645'13669	6'45137
" Foot	= 144 square inches,	= ...	928'99683
" Yard	= 9 " feet,	= ...	8,360'97150
" Perch	= 30'25 " yards,	= ...	...
Rood	= 40 " perches,	= ...	...
Acre	= 4 roods,	= ...	...
Square Mile	= 640 acres,	= ...	...

MULTI

	Square Inches to Sq. Millims. Sq. Centims.	Square Feet to Sq. Centims. Sq. Decims. Sq. Metres.	Square Yards to Sq. Decims. Sq. Metres.
1	645'137 6'451	928'997 9'2900 0'093	83'610 0'8361
2	1290'273 12'903	1,857'994 18'5799 0'186	167'219 1'6722
3	1935'410 19'354	2,786'990 27'8699 0'279	250'829 2'5083
4	2580'547 25'805	3,715'987 37'1599 0'372	334'439 3'3444
5	3225'683 32'257	4,644'984 46'4498 0'464	418'049 4'1805
6	3870'820 38'708	5,573'981 55'7398 0'557	501'658 5'0166
7	4515'957 45'160	6,502'978 65'0298 0'650	585'268 5'8527
8	5161'094 51'611	7,431'975 74'3197 0'743	668'878 6'6888
9	5806'230 58'062	8,360'971 83'6097 0'836	752'487 7'5249
10	6451'367 64'514	9,289'968 92'8997 0'929	836'097 8'3610

One square millimetre is nearly $\frac{1}{625}$ of a square inch, or the square of $\frac{1}{25}$ of an inch.

One square centimetre is nearly $\frac{1}{6.25}$ of a square inch, or the square of $\frac{1}{2.5}$ of an inch.

One square metre contains rather more than 10 $\frac{1}{2}$ square feet, or nearly 1 $\frac{1}{4}$ square yards.

One are is about $\frac{1}{4}$ of an acre.

One hectare contains nearly 2 $\frac{1}{2}$ acres,

Approximate

Measure,

British.

is the ARE = 100 square Metres or a square Decametre.

Sq. Yards.	Sq. Perches.	Roods.	Acres.
...
0'00012	...	...	...
0'01196	0'00040	0'00001	...
1'19603	0'03954	0'00099	0'00025
119'60333	3'95383	0'09885	0'02471
11,960'33260	395'38290	9'88457	2'47114

PLIERS.

Sq. Metres to		Ares to			Hectares to			
Sq. Feet.	Sq. Yds.	Sq. Yds.	Perches.	Roods.	Acres.	Roods.	Acres.	
10'764	1'196	119'603	3'954	0'099	0'025	9'885	2'471	1
21'529	2'392	239'207	7'908	0'198	0'049	19'769	4'942	2
32'293	3'588	358'810	11'861	0'297	0'074	29'654	7'413	3
43'057	4'784	478'413	15'815	0'395	0'099	39'538	9'885	4
53'821	5'980	598'017	19'769	0'494	0'124	49'423	12'356	5
64'586	7'176	717'620	23'723	0'593	0'148	59'307	14'827	6
75'350	8'372	837'223	27'677	0'692	0'173	69'192	17'298	7
86'114	9'568	956'827	31'631	0'791	0'198	79'077	19'769	8
96'879	10'764	1,076'430	35'584	0'890	0'222	88'961	22'240	9
107'643	11'960	1,196'033	39'538	0'988	0'247	98'846	24'711	10

to Metric.

Sq. Decimetres.	Sq. Metres.	Ares.	Hectares.
0'06451	0'00065	0'00001	...
9'28997	0'09290	0'00093	0'00001
83'60971	0'83610	0'00836	0'00008
2,529'19388	25'29194	0'25292	0'00253
...	1,011'67755	10'11678	0'10117
...	4,046'71021	40'46710	0'40467
...	...	25,898'94531	258'98945

PLIERS.

Sq. Perches to		Rood to	Acres to		Square Miles to		
Sq. Metres.	Ares.	Ares.	Ares.	Hectares.	Hectares.		
25'292	0'253	10'117	40'467	0'405	258'989		1
50'584	0'506	20'234	80'934	0'809	517'979		2
75'876	0'759	30'350	121'401	1'214	776'968		3
101'168	1'012	40'467	161'868	1'619	1,035'958		4
126'460	1'265	50'584	202'336	2'023	1,294'947		5
151'752	1'518	60'701	242'803	2'428	1,553'937		6
177'044	1'770	70'817	283'270	2'833	1,812'926		7
202'336	2'023	80'934	323'737	3'237	2,071'916		8
227'627	2'276	91'051	364'204	3'642	2,330'905		9
252'919	2'529	101'168	404'671	4'047	2,589'895		10

Values.

One square inch contains about 645 square millimetres or $6\frac{1}{2}$ square centimetres.
 One square foot contains nearly 90 square decimetres or $\frac{1}{11}$ of a square metre.
 One square yard is nearly $\frac{1}{9}$ or $\frac{1}{11}$ of a square metre.
 1 Acre is nearly 40 $\frac{1}{2}$ ares or $\frac{1}{4}$ of a hectare.
 1 Square mile is very nearly 259 hectares.

VI.—Conversion of British

British Indian

The unit of British Indian Weight

			Milligrammes.	Centigrammes.
Dhan	= $\frac{1}{16}$ Tola	= $\frac{1}{16}$ Grain	= 30'37451	3'03745
Rati	= $\frac{1}{8}$ " "	= $\frac{1}{8}$ Grains	= 121'49803	12'14980
Masha	= $\frac{1}{4}$ " "	= 15 " "	= 971'08426	97'19843
Tola	= 1 " "	= 180 " "	= 11663'81107	1166'38111
Chhatak	= 5 Tolas	= 900 " "	= 58319'05533	5831'90553
Ser (Seer)	= 80 " "	= 2lbs 400 Grains avoird.	= 933104'88524	93310'48852
Man (Maund)	= 3,200 " "	= 82½ lbs Avoird. 100lbs. Troy=		3732419'54095

Under Bengal Regulation VII of 1833, the only legalised British Indian weights are the *Tola*, of 180 grains Troy; the and their values vary considerably in different parts of India; those stated in the table are given by Prinsep (*Useful Tables*,

MULTI

	Dhans to	Ratis to	Mashas to	Tolas to		
	Milligrammes.	Milligrammes.	Milligrammes.	Grammes.	Decagrammes.	Kilogrammes.
1	= 30'375	121'498	971'084	0'972	11'664	1'166
2	= 60'749	242'996	1943'069	1'944	23'328	2'332
3	= 91'124	364'494	2915'053	2'915	34'991	3'499
4	= 121'498	485'992	3887'237	3'888	46'655	4'666
5	= 151'873	607'490	4859'921	4'860	58'319	5'832
6	= 182'247	728'988	5831'906	5'832	69'983	6'998
7	= 212'622	850'486	6803'890	6'804	81'647	8'165
8	= 242'996	971'984	7775'874	7'776	93'310	9'331
9	= 273'371	1093'482	8747'858	8'748	104'974	10'497
10	= 303'745	1214'980	9719'843	9'720	116'638	11'664

Metric to

	Dhans.	Batis.	Mashas.
Milligramme	= 0'03292	0'00823	0'00103
Centigramme	= 0'32922	0'08231	0'01029
Decigramme	= 3'29223	0'82305	0'10288
Gramme	= 32'92234	8'23059	1'02882
Decagramme	= 329'22344	82'30586	10'28823
Hectogramme	= 3292'23440	823'05860	102'88232
Kilogramme	= 32922'34398	8230'58599	1028'82325
Myriagramme	= .....	.....	10288'23449
Quintal	= .....	.....	102882'32493
Millier or Tonne	= .....	.....	.....

MULTI

	Dhans.	Ratis.	Mashas.	Tolas.	Chhataks.	Sers.
1	32'922	8'231	1'029	0'086	0'017	0'0011
2	65'845	16'461	2'058	0'171	0'034	0'0021
3	98'767	24'692	3'086	0'257	0'051	0'0032
4	131'689	32'922	4'115	0'343	0'069	0'0043
5	164'612	41'153	5'144	0'429	0'085	0'0054
6	197'534	49'384	6'173	0'514	0'103	0'0064
7	230'456	57'614	7'202	0'600	0'120	0'0075
8	263'379	65'845	8'231	0'686	0'137	0'0086
9	296'301	74'075	9'259	0'772	0'154	0'0096
10	329'223	82'305	10'288	0'857	0'171	0'0107

Approximate Equivalents.

- 1 Rati is nearly $1\frac{1}{4}$ decigrammes (about '035 less).
- 1 Masha is nearly 1 gramme (about '028 less).
- 1 Tola is nearly $1\frac{1}{8}$ grammes (about '003 less).
- 1 Ser is nearly 1 kilogramme (about '007 less).
- 1 Man is nearly $3\frac{1}{2}$ myriagrammes (about '018 less).
- " " $37\frac{1}{2}$ kilogrammes (about '003 less).
- 1 Decigramme is nearly $\frac{1}{16}$ of a tola, or $3\frac{1}{8}$ dhans (about '04 less).
- 1 Gramme is nearly 1 masha or $\frac{1}{16}$ of a tola (about '039 more).
- 1 Decagramme is about $\frac{1}{16}$ of a tola (about '007 more).
- 1 Hectogramme is about $8\frac{1}{8}$ tolas (about '074 more) or nearly $1\frac{1}{8}$ chhataks (about '035 less).
- 1 Kilogramme is nearly $8\frac{1}{8}$ tolas (about '015 less) or about 1 ser (about '072 more).
- 1 Quintal is about $2\frac{1}{2}$ mans (about '0125 more).
- 1 Millier or Tonne is nearly $26\frac{1}{2}$ mans (about '008 less).

Indian and Metric Weights.

to Metric.

is the TOLA, equal to 180 Grains.

Decigrammes.	Grammes.	Decagrammes.	Hectogrammes.	Kilogrammes.	Myriagrammes.
0'30375	0'03037	0'00304	0'00030	0'00003	.....
1'21408	0'12150	0'01215	0'00121	0'00012	0'00001
9'71981	0'07108	0'00720	0'00072	0'00007	0'00010
116'63811	11'66381	1'16638	0'11664	0'01166	0'00117
583'10055	58'31005	5'83101	0'58319	0'05812	0'00583
9331'04885	933'10489	93'31049	9'33105	0'93310	0'09331
373241'95410	37324'19541	3732'41954	373'24195	37'32420	3'73243

Ser equal to 80 Tolas and the Man equal to 40 Sers. Mashas, Ratis and Dhans are used by native goldsmiths and jewellers, p. 96). There is also a weight called Panseri equal to 5 sers.

PLIERS.

Ohhataks to		Sers to		Mans to	
Grammes.	Kilogrammes.	Grammes.	Kilogrammes.	Kilogrammes.	
58'310	0'058	933'105	0'933	37'324	1
116'638	0'117	1856'210	1'866	74'648	2
174'957	0'175	2799'315	2'799	111'973	3
233'276	0'233	3732'420	3'732	149'297	4
291'595	0'292	4665'524	4'666	186'621	5
349'914	0'350	5598'629	5'599	223'945	6
408'233	0'408	6531'734	6'532	261'269	7
466'552	0'467	7464'839	7'465	298'594	8
524'871	0'525	8397'944	8'398	335'918	9
583'191	0'583	9331'049	9'331	373'242	10

British Indian.

Tolas.	Ohhataks.	Sers.	Mans.
0'00009	0'00002	.....	.....
0'00086	0'00017	0'00001	.....
0'00857	0'00171	0'00011	.....
0'08574	0'01715	0'00107	0'00003
0'85735	0'17147	0'01072	0'00027
8'57353	1'71471	0'10717	0'00268
85'73527	17'14705	1'07169	0'02670
857'35271	171'47054	10'71691	0'26792
8573'52708	1714'70543	107'16909	2'67923
85735'27078	17147'05416	1071'69088	26'79227

PLIERS.

Kilogrammes to		Quintals to	
Tolas.	Ohhataks.	Mans.	
85'735	17'147	0'0268	2'6792
171'471	34'294	0'0536	5'3585
257'206	51'441	0'0804	8'0377
342'941	68'588	0'1072	10'7169
428'676	85'735	0'1340	13'3961
514'412	102'882	0'1608	16'0753
600'147	120'029	0'1875	18'7546
685'882	137'176	0'2143	21'4338
771'617	154'323	0'2411	24'1130
857'353	171'471	0'2679	26'7923

Fractions of a Tola to Milligrammes.

$$\begin{aligned} \frac{1}{10} &= 728'988 \\ \frac{1}{100} &= 1457'976 \\ \frac{1}{1000} &= 2015'953 \\ \frac{1}{10000} &= 3887'937 \end{aligned}$$

$$\begin{aligned} \frac{1}{10} &= 4373'929 \\ \frac{1}{100} &= 5831'906 \\ \frac{1}{1000} &= 7775'874 \\ \frac{1}{10000} &= 8747'858 \end{aligned}$$

Useful Data.

- 1 Man is equal to 100 lb Troy.
- 35 Sers are equal to 72 lb Avoirdupois.
- 1 Pound Troy is equal to 32 Tolas.
- 1 Ounce Troy is equal to 2'67 Tolas.
- $\frac{1}{2}$ Ounce Avoirdupois (the unit for English letter postage) = 1'215 Tolas.
- 15 Grammes (the unit for foreign letter postage) = 1'286 Tolas or about $\frac{1}{4}$ Tolas.

VII.—Table of Sizes of Lithographic and Drawing

DESCRIPTION.	Broadside.	Long folio.	Long thirds.	Long fourths.	Broad folio.	Broad thirds.
LITHOGRAPHIC						
Special	$59 \times 38\frac{1}{4}$	$59 \times 19\frac{1}{8}$	$59 \times 12\frac{3}{8}$	$59 \times 9\frac{9}{16}$	$38\frac{1}{4} \times 29\frac{1}{8}$	$38\frac{1}{4} \times 19\frac{3}{8}$
Antiquarian	$53\frac{1}{2} \times 31\frac{1}{4}$	$53\frac{1}{2} \times 15\frac{5}{8}$	$53\frac{1}{2} \times 10\frac{5}{12}$	$53\frac{1}{2} \times 7\frac{13}{16}$	$31\frac{1}{4} \times 26\frac{3}{8}$	$31\frac{1}{4} \times 17\frac{5}{8}$
Double Imperial	$44\frac{1}{4} \times 30\frac{1}{4}$	$44\frac{1}{4} \times 15\frac{1}{8}$	$44\frac{1}{4} \times 10\frac{1}{2}$	$44\frac{1}{4} \times 7\frac{9}{16}$	$30\frac{1}{4} \times 22\frac{1}{8}$	$30\frac{1}{4} \times 14\frac{3}{8}$
Thick Special	40×40	40×20	$40 \times 13\frac{1}{8}$	40×10	40×20	$40 \times 13\frac{1}{8}$
Double Elephant	40×27	$40 \times 13\frac{1}{2}$	40×9	$40 \times 6\frac{3}{4}$	27×20	$27 \times 13\frac{1}{2}$
Double Royal	40×25	$40 \times 12\frac{1}{2}$	$40 \times 8\frac{3}{8}$	$40 \times 6\frac{1}{4}$	25×20	$25 \times 13\frac{1}{8}$
Atlas	$34 \times 26\frac{1}{2}$	$34 \times 13\frac{1}{4}$	$34 \times 8\frac{5}{8}$	$34 \times 6\frac{5}{8}$	$26\frac{1}{2} \times 17$	$26\frac{1}{2} \times 11\frac{1}{4}$
Imperial	30×22	30×11	$30 \times 7\frac{1}{2}$	$30 \times 5\frac{1}{2}$	22×15	22×10
Super Royal	$27 \times 19\frac{1}{2}$	$27 \times 9\frac{3}{8}$	$27 \times 6\frac{1}{2}$	$27 \times 4\frac{7}{8}$	$19\frac{1}{2} \times 13\frac{1}{2}$	$19\frac{1}{2} \times 9$

WHATMAN'S HAND-MADE

Antiquarian	$53\frac{1}{2} \times 30\frac{1}{2}$	$53\frac{1}{2} \times 15\frac{1}{4}$	$53\frac{1}{2} \times 10\frac{1}{8}$	$53\frac{1}{2} \times 7\frac{5}{8}$	$30\frac{1}{2} \times 26\frac{3}{8}$	$30\frac{1}{2} \times 17\frac{3}{8}$
Double Elephant	$40\frac{1}{2} \times 27$	$40\frac{1}{2} \times 13\frac{1}{2}$	$40\frac{1}{2} \times 9$	$40\frac{1}{2} \times 6\frac{3}{4}$	$27 \times 20\frac{1}{4}$	$27 \times 13\frac{1}{2}$
Atlas	$33\frac{1}{2} \times 26$	$33\frac{1}{2} \times 13$	$33\frac{1}{2} \times 8\frac{3}{8}$	$33\frac{1}{2} \times 6\frac{1}{4}$	$26 \times 16\frac{3}{4}$	$26 \times 11\frac{1}{8}$
Imperial	$30\frac{1}{2} \times 22$	$30\frac{1}{2} \times 11$	$30\frac{1}{2} \times 7\frac{1}{2}$	$30\frac{1}{2} \times 5\frac{1}{2}$	$22 \times 15\frac{1}{4}$	$22 \times 10\frac{1}{8}$
Super Royal	$27 \times 19\frac{1}{2}$	$27 \times 9\frac{3}{8}$	$27 \times 6\frac{1}{2}$	$27 \times 4\frac{7}{8}$	$19\frac{1}{2} \times 13\frac{1}{2}$	$19\frac{1}{2} \times 9$
Royal	$24 \times 19\frac{1}{2}$	$24 \times 9\frac{3}{4}$	$24 \times 6\frac{1}{2}$	$24 \times 4\frac{7}{8}$	$19\frac{1}{2} \times 12$	$19\frac{1}{2} \times 8$
Medium	$22 \times 17\frac{1}{2}$	$22 \times 8\frac{3}{4}$	$22 \times 5\frac{5}{8}$	$22 \times 4\frac{3}{8}$	$17\frac{1}{2} \times 11$	$17\frac{1}{2} \times 7\frac{1}{8}$
Demy	$20 \times 15\frac{1}{2}$	$20 \times 7\frac{3}{4}$	$20 \times 5\frac{1}{8}$	$20 \times 3\frac{7}{8}$	$15\frac{1}{2} \times 10$	$15\frac{1}{2} \times 6\frac{3}{8}$

Papers and their Principal Subdivisions.

Long quarto.	Broad quarto.	Long octavo.	Common octavo.	Long 12mo.	Common 12mo.	16mo.	32mo.
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PAPERS.

$38\frac{1}{4} \times 14\frac{3}{4}$	$29\frac{1}{2} \times 19\frac{1}{2}$	$29\frac{1}{2} \times 9\frac{9}{16}$	$19\frac{1}{8} \times 14\frac{3}{4}$	$19\frac{1}{8} \times 9\frac{9}{16}$	$19\frac{1}{8} \times 9\frac{9}{16}$	$14\frac{3}{4} \times 9\frac{9}{16}$	$9\frac{9}{16} \times 7\frac{3}{8}$
$31\frac{1}{4} \times 13\frac{3}{8}$	$26\frac{3}{4} \times 15\frac{5}{8}$	$26\frac{3}{4} \times 7\frac{13}{16}$	$15\frac{5}{8} \times 13\frac{3}{8}$	$15\frac{5}{8} \times 8\frac{11}{12}$	$17\frac{5}{8} \times 7\frac{13}{16}$	$13\frac{3}{8} \times 7\frac{13}{16}$	$7\frac{13}{16} \times 6\frac{11}{16}$
$30\frac{1}{4} \times 11\frac{1}{16}$	$22\frac{1}{2} \times 15\frac{1}{8}$	$22\frac{1}{2} \times 7\frac{9}{16}$	$15\frac{1}{8} \times 11\frac{1}{16}$	$15\frac{1}{8} \times 7\frac{3}{8}$	$14\frac{3}{4} \times 7\frac{9}{16}$	$11\frac{1}{16} \times 7\frac{9}{16}$	$7\frac{9}{16} \times 5\frac{7}{16}$
40×10	20×20	20×10	20×10	$20 \times 6\frac{3}{4}$	$13\frac{1}{2} \times 10$	10×10	10×5
27×10	$20 \times 13\frac{1}{2}$	$20 \times 6\frac{3}{4}$	$13\frac{1}{2} \times 10$	$13\frac{1}{2} \times 6\frac{3}{4}$	$13\frac{1}{8} \times 6\frac{3}{4}$	$10 \times 6\frac{1}{2}$	$6\frac{3}{4} \times 5$
25×10	$20 \times 12\frac{1}{2}$	$20 \times 6\frac{1}{2}$	$12\frac{1}{2} \times 10$	$12\frac{1}{2} \times 6\frac{3}{8}$	$13\frac{1}{8} \times 6\frac{1}{2}$	$10 \times 6\frac{1}{4}$	$6\frac{1}{4} \times 5$
$26\frac{1}{2} \times 8\frac{1}{2}$	$17 \times 13\frac{1}{4}$	$17 \times 6\frac{5}{8}$	$13\frac{1}{4} \times 8\frac{1}{2}$	$13\frac{1}{4} \times 5\frac{3}{4}$	$11\frac{1}{2} \times 6\frac{5}{8}$	$8\frac{1}{2} \times 6\frac{5}{8}$	$6\frac{5}{8} \times 4\frac{1}{2}$
$22 \times 7\frac{1}{2}$	15×11	$15 \times 5\frac{1}{2}$	$11 \times 7\frac{1}{2}$	11×5	$10 \times 5\frac{1}{2}$	$7\frac{1}{2} \times 5\frac{1}{2}$	$5\frac{1}{2} \times 3\frac{3}{4}$
$19\frac{1}{2} \times 6\frac{3}{4}$	$13\frac{1}{2} \times 9\frac{3}{4}$	$13\frac{1}{2} \times 4\frac{7}{8}$	$9\frac{3}{4} \times 6\frac{3}{4}$	$9\frac{3}{4} \times 4\frac{1}{2}$	$9 \times 4\frac{7}{8}$	$6\frac{3}{4} \times 4\frac{7}{8}$	$4\frac{7}{8} \times 3\frac{3}{8}$

DRAWING PAPERS.

$30\frac{1}{2} \times 13\frac{5}{16}$	$26\frac{5}{8} \times 15\frac{1}{4}$	$26\frac{5}{8} \times 7\frac{5}{8}$	$15\frac{1}{4} \times 13\frac{5}{16}$	$15\frac{1}{4} \times 8\frac{7}{8}$	$17\frac{3}{4} \times 7\frac{5}{8}$	$13\frac{5}{16} \times 7\frac{5}{8}$	$7\frac{5}{8} \times 6\frac{11}{16}$
$27 \times 10\frac{1}{8}$	$20\frac{1}{4} \times 13\frac{1}{2}$	$20\frac{1}{4} \times 6\frac{3}{4}$	$13\frac{1}{2} \times 10\frac{1}{8}$	$13\frac{1}{2} \times 6\frac{3}{4}$	$13\frac{1}{4} \times 6\frac{3}{4}$	$10\frac{1}{8} \times 6\frac{3}{4}$	$6\frac{3}{4} \times 5\frac{11}{16}$
$26 \times 8\frac{3}{8}$	$16\frac{3}{4} \times 13$	$16\frac{3}{4} \times 6\frac{1}{2}$	$13 \times 8\frac{3}{8}$	$13 \times 5\frac{7}{8}$	$11\frac{1}{8} \times 6\frac{1}{2}$	$8\frac{3}{8} \times 6\frac{1}{2}$	$6\frac{1}{2} \times 4\frac{3}{8}$
$22 \times 7\frac{5}{8}$	$15\frac{1}{4} \times 11$	$15\frac{1}{4} \times 5\frac{1}{2}$	$11 \times 7\frac{5}{8}$	$11 \times 5\frac{1}{2}$	$10\frac{1}{8} \times 5\frac{1}{2}$	$7\frac{5}{8} \times 5\frac{1}{2}$	$5\frac{1}{2} \times 3\frac{11}{16}$
$19\frac{1}{2} \times 6\frac{3}{4}$	$13\frac{1}{2} \times 9\frac{3}{4}$	$13\frac{1}{2} \times 4\frac{7}{8}$	$9\frac{3}{4} \times 6\frac{3}{4}$	$9\frac{3}{4} \times 4\frac{1}{2}$	$9 \times 4\frac{7}{8}$	$6\frac{3}{4} \times 4\frac{7}{8}$	$4\frac{7}{8} \times 3\frac{3}{8}$
$19\frac{1}{2} \times 6$	$12 \times 9\frac{3}{4}$	$12 \times 4\frac{7}{8}$	$9\frac{3}{4} \times 6$	$9\frac{3}{4} \times 4$	$8 \times 4\frac{7}{8}$	$6 \times 4\frac{7}{8}$	$4\frac{7}{8} \times 3$
$17\frac{1}{2} \times 5\frac{1}{2}$	$11 \times 8\frac{3}{4}$	$11 \times 4\frac{3}{8}$	$8\frac{3}{4} \times 5\frac{1}{2}$	$8\frac{3}{4} \times 3\frac{3}{4}$	$7\frac{1}{2} \times 4\frac{3}{8}$	$5\frac{1}{2} \times 4\frac{3}{8}$	$4\frac{3}{8} \times 2\frac{3}{4}$
$15\frac{1}{2} \times 5$	$10 \times 7\frac{1}{2}$	$10 \times 3\frac{7}{8}$	$7\frac{1}{2} \times 5$	$7\frac{1}{2} \times 3\frac{1}{2}$	$6\frac{1}{2} \times 3\frac{1}{2}$	$5 \times 3\frac{7}{8}$	$3\frac{7}{8} \times 1\frac{11}{16}$

VII.—Table of Sizes of Printing and Writing

DESCRIPTION.	Broad side.	Long folio.	Long thirds.	Long fourths.	Broad folio.	Broad thirds.
PRINTING						
Double Super Royal . . .	$41 \times 27\frac{1}{2}$	$41 \times 13\frac{3}{4}$	$41 \times 9\frac{1}{8}$	$41 \times 6\frac{1}{8}$	$27\frac{1}{2} \times 20\frac{1}{2}$	$27\frac{1}{2} \times 13\frac{3}{8}$
Do. Royal	40×25	$40 \times 12\frac{1}{2}$	$40 \times 8\frac{1}{2}$	$40 \times 6\frac{1}{4}$	25×20	$25 \times 13\frac{1}{2}$
Do. Demy	$35 \times 22\frac{1}{2}$	$35 \times 11\frac{1}{8}$	$35 \times 7\frac{1}{4}$	$35 \times 5\frac{5}{8}$	$22\frac{1}{2} \times 17\frac{1}{2}$	$22\frac{1}{2} \times 11\frac{3}{8}$
Imperial	30×22	30×11	$30 \times 7\frac{1}{4}$	$30 \times 5\frac{1}{2}$	22×15	22×10
Double Crown	30×20	30×10	$30 \times 6\frac{3}{8}$	30×5	20×15	20×10
Super Royal	$28\frac{1}{2} \times 21\frac{1}{2}$	$28\frac{1}{2} \times 10\frac{3}{4}$	$28\frac{1}{2} \times 7\frac{1}{8}$	$28\frac{1}{2} \times 5\frac{3}{8}$	$21\frac{1}{2} \times 14\frac{1}{4}$	$21\frac{1}{2} \times 9\frac{1}{2}$
Double Foolscap	27×17	$27 \times 8\frac{1}{2}$	$27 \times 5\frac{3}{8}$	$27 \times 4\frac{1}{4}$	$17 \times 13\frac{1}{2}$	17×9
Royal	25×20	25×10	$25 \times 6\frac{3}{8}$	25×5	$20 \times 12\frac{1}{2}$	$20 \times 8\frac{1}{2}$
Medium	24×19	$24 \times 9\frac{1}{2}$	$24 \times 6\frac{1}{2}$	$24 \times 4\frac{5}{8}$	19×12	19×8
Demy	$22\frac{1}{4} \times 18$	$22\frac{1}{4} \times 9$	$22\frac{1}{4} \times 6$	$22\frac{1}{4} \times 4\frac{1}{2}$	$18 \times 11\frac{1}{8}$	$18 \times 7\frac{1}{2}$
Crown	20×15	$20 \times 7\frac{1}{2}$	20×5	$20 \times 3\frac{3}{4}$	15×10	$15 \times 6\frac{3}{8}$
Foolscap	$17 \times 13\frac{1}{2}$	$17 \times 6\frac{3}{4}$	$17 \times 4\frac{1}{2}$	$17 \times 3\frac{3}{8}$	$13\frac{1}{2} \times 8\frac{1}{2}$	$13\frac{1}{2} \times 5\frac{3}{8}$

WRITING

Imperial	30×22	30×11	$30 \times 7\frac{1}{4}$	$30 \times 5\frac{1}{2}$	22×15	22×10
Super Royal H. M. B. L. . . .	$27 \times 19\frac{1}{4}$	$27 \times 9\frac{5}{8}$	$27 \times 6\frac{5}{16}$	$27 \times 4\frac{13}{16}$	$19\frac{1}{4} \times 13\frac{1}{2}$	$19\frac{1}{4} \times 9$
Royal H. M. B. L.	$24\frac{1}{4} \times 19\frac{1}{8}$	$24\frac{1}{4} \times 9\frac{3}{8}$	$24\frac{1}{4} \times 6\frac{1}{2}$	$24\frac{1}{4} \times 4\frac{7}{8}$	$19\frac{1}{8} \times 12\frac{3}{8}$	$19\frac{1}{8} \times 8\frac{1}{16}$
Do. H. M.	$24 \times 19\frac{1}{2}$	$24 \times 9\frac{3}{8}$	$24 \times 6\frac{1}{2}$	$24 \times 4\frac{1}{8}$	$19\frac{1}{2} \times 12$	$19\frac{1}{2} \times 8$
Medium H. M. B. L.	$22 \times 17\frac{1}{2}$	$22 \times 8\frac{5}{8}$	$22 \times 5\frac{3}{8}$	$22 \times 4\frac{5}{16}$	$17\frac{1}{2} \times 11$	$17\frac{1}{2} \times 7\frac{1}{2}$
Do. M. M. B. L.	$22\frac{1}{2} \times 17\frac{3}{4}$	$22\frac{1}{2} \times 8\frac{7}{8}$	$22\frac{1}{2} \times 5\frac{11}{16}$	$22\frac{1}{2} \times 4\frac{7}{16}$	$17\frac{3}{4} \times 11\frac{1}{4}$	$17\frac{3}{4} \times 7\frac{1}{2}$
Demy H. M. B. L.	$20 \times 15\frac{3}{4}$	$20 \times 7\frac{7}{8}$	$20 \times 5\frac{1}{4}$	$20 \times 3\frac{15}{16}$	$15\frac{3}{4} \times 10$	$15\frac{3}{4} \times 6\frac{3}{8}$
Do. M. M. B. L.	$20\frac{1}{4} \times 15\frac{1}{2}$	$20\frac{1}{4} \times 7\frac{3}{4}$	$20\frac{1}{4} \times 5\frac{1}{8}$	$20\frac{1}{4} \times 3\frac{13}{16}$	$15\frac{1}{4} \times 10\frac{1}{2}$	$15\frac{1}{4} \times 6\frac{1}{2}$
Double Foolscap M. M. . . .	27×17	$27 \times 8\frac{1}{2}$	$27 \times 5\frac{3}{8}$	$27 \times 4\frac{1}{4}$	$17 \times 13\frac{1}{2}$	17×9
Foolscap H. M. B. L.	$17 \times 13\frac{1}{2}$	$17 \times 6\frac{3}{4}$	$17 \times 4\frac{1}{2}$	$17 \times 3\frac{3}{8}$	$13\frac{1}{2} \times 8\frac{1}{2}$	$13\frac{1}{2} \times 5\frac{3}{8}$
Do. M. M.	$16\frac{1}{2} \times 13\frac{1}{2}$	$16\frac{1}{2} \times 6\frac{5}{8}$	$16\frac{1}{2} \times 4\frac{5}{16}$	$16\frac{1}{2} \times 3\frac{5}{16}$	$13\frac{1}{2} \times 8\frac{1}{4}$	$13\frac{1}{2} \times 5\frac{1}{2}$

Papers and their Principal Subdivisions—*continued.*

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PAPERS.

$27\frac{1}{2} \times 10\frac{1}{4}$	$20\frac{1}{2} \times 13\frac{3}{4}$	$20\frac{1}{2} \times 6\frac{1}{8}$	$13\frac{3}{4} \times 10\frac{1}{4}$	$13\frac{3}{4} \times 6\frac{5}{8}$	$13\frac{3}{4} \times 6\frac{1}{8}$	$10\frac{1}{4} \times 6\frac{1}{8}$	$6\frac{1}{8} \times 5\frac{1}{8}$
25×10	$20 \times 12\frac{1}{2}$	$20 \times 6\frac{1}{4}$	$12\frac{1}{2} \times 10$	$12\frac{1}{2} \times 6\frac{3}{8}$	$13\frac{1}{8} \times 6\frac{1}{4}$	$10 \times 6\frac{1}{4}$	$6\frac{1}{4} \times 5$
$22\frac{1}{2} \times 8\frac{3}{4}$	$17\frac{1}{2} \times 11\frac{1}{4}$	$17\frac{1}{2} \times 5\frac{5}{8}$	$11\frac{1}{4} \times 8\frac{3}{4}$	$11\frac{1}{4} \times 5\frac{5}{8}$	$11\frac{2}{3} \times 5\frac{5}{8}$	$8\frac{3}{4} \times 5\frac{5}{8}$	$5\frac{5}{8} \times 4\frac{3}{8}$
$22 \times 7\frac{1}{2}$	15×11	$15 \times 5\frac{1}{2}$	$11 \times 7\frac{1}{2}$	11×5	$10 \times 5\frac{1}{2}$	$7\frac{1}{2} \times 5\frac{1}{2}$	$5\frac{1}{2} \times 3\frac{3}{4}$
$20 \times 7\frac{1}{2}$	15×10	15×5	$10 \times 7\frac{1}{2}$	10×5	10×5	$7\frac{1}{2} \times 5$	$5 \times 3\frac{3}{4}$
$21\frac{1}{2} \times 7\frac{1}{8}$	$14\frac{1}{4} \times 10\frac{3}{4}$	$14\frac{1}{4} \times 5\frac{3}{8}$	$10\frac{3}{4} \times 7\frac{1}{8}$	$10\frac{3}{4} \times 4\frac{3}{4}$	$9\frac{1}{2} \times 5\frac{3}{8}$	$7\frac{1}{8} \times 5\frac{3}{8}$	$5\frac{3}{8} \times 3\frac{9}{16}$
$17 \times 6\frac{3}{4}$	$13\frac{1}{2} \times 8\frac{1}{2}$	$13\frac{1}{2} \times 4\frac{1}{4}$	$8\frac{1}{2} \times 6\frac{3}{4}$	$8\frac{1}{2} \times 4\frac{1}{2}$	$9 \times 4\frac{1}{4}$	$6\frac{3}{4} \times 4\frac{1}{4}$	$4\frac{1}{4} \times 3\frac{3}{8}$
$20 \times 6\frac{1}{4}$	$12\frac{1}{2} \times 10$	$12\frac{1}{2} \times 5$	$10 \times 6\frac{1}{4}$	$10 \times 4\frac{1}{8}$	$8\frac{1}{2} \times 5$	$6\frac{1}{4} \times 5$	$5 \times 3\frac{3}{8}$
19×6	$12 \times 9\frac{1}{2}$	$12 \times 4\frac{3}{4}$	$9\frac{1}{2} \times 6$	$9\frac{1}{2} \times 4$	$8 \times 4\frac{3}{4}$	$6 \times 4\frac{3}{4}$	$4\frac{3}{4} \times 3$
$18 \times 5\frac{9}{16}$	$11\frac{1}{8} \times 9$	$11\frac{1}{8} \times 4\frac{1}{2}$	$9 \times 5\frac{9}{16}$	$9 \times 3\frac{1}{2}$	$7\frac{5}{12} \times 4\frac{1}{2}$	$5\frac{9}{16} \times 4\frac{1}{2}$	$4\frac{1}{2} \times 2\frac{3}{8}$
15×5	$10 \times 7\frac{1}{2}$	$10 \times 3\frac{3}{4}$	$7\frac{1}{2} \times 5$	$7\frac{1}{2} \times 3\frac{1}{2}$	$6\frac{3}{8} \times 3\frac{3}{4}$	$5 \times 3\frac{3}{4}$	$3\frac{3}{4} \times 2\frac{1}{2}$
$13\frac{1}{2} \times 4\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2}$	$8\frac{1}{2} \times 3\frac{3}{8}$	$6\frac{1}{2} \times 4\frac{1}{4}$	$6\frac{1}{2} \times 2\frac{5}{8}$	$5\frac{3}{8} \times 3\frac{3}{8}$	$4\frac{1}{4} \times 3\frac{3}{8}$	$3\frac{3}{8} \times 2\frac{1}{8}$

PAPERS.

$22 \times 7\frac{1}{2}$	15×11	$15 \times 5\frac{1}{2}$	$11 \times 7\frac{1}{2}$	11×5	$10 \times 5\frac{1}{2}$	$7\frac{1}{2} \times 5\frac{1}{2}$	$5\frac{1}{2} \times 3\frac{3}{4}$
$19\frac{1}{4} \times 6\frac{3}{4}$	$13\frac{1}{2} \times 9\frac{5}{8}$	$13\frac{1}{2} \times 4\frac{1}{8}$	$9\frac{5}{8} \times 6\frac{3}{4}$	$9\frac{5}{8} \times 4\frac{1}{2}$	$9 \times 4\frac{1}{8}$	$6\frac{3}{8} \times 4\frac{1}{8}$	$4\frac{1}{8} \times 3\frac{3}{8}$
$19\frac{1}{2} \times 6\frac{1}{16}$	$12\frac{1}{8} \times 9\frac{3}{4}$	$12\frac{1}{8} \times 4\frac{7}{8}$	$9\frac{3}{4} \times 6\frac{1}{16}$	$9\frac{3}{4} \times 4\frac{1}{2}$	$8\frac{1}{16} \times 4\frac{7}{8}$	$6\frac{1}{16} \times 4\frac{7}{8}$	$4\frac{7}{8} \times 3\frac{3}{8}$
$19\frac{1}{2} \times 6$	$12 \times 9\frac{3}{4}$	$12 \times 4\frac{7}{8}$	$9\frac{3}{4} \times 6$	$9\frac{3}{4} \times 4$	$8 \times 4\frac{7}{8}$	$6 \times 4\frac{7}{8}$	$4\frac{7}{8} \times 3$
$17\frac{1}{4} \times 5\frac{1}{2}$	$11 \times 8\frac{5}{8}$	$11 \times 4\frac{5}{16}$	$8\frac{5}{8} \times 5\frac{1}{2}$	$8\frac{5}{8} \times 3\frac{3}{8}$	$7\frac{1}{2} \times 4\frac{5}{16}$	$5\frac{1}{2} \times 4\frac{5}{16}$	$4\frac{5}{16} \times 2\frac{3}{4}$
$17\frac{3}{4} \times 5\frac{5}{8}$	$11\frac{1}{4} \times 8\frac{7}{8}$	$11\frac{1}{4} \times 4\frac{7}{16}$	$8\frac{7}{8} \times 5\frac{5}{8}$	$8\frac{7}{8} \times 3\frac{3}{4}$	$7\frac{1}{2} \times 4\frac{7}{16}$	$5\frac{5}{8} \times 4\frac{7}{16}$	$4\frac{7}{16} \times 2\frac{1}{8}$
$15\frac{3}{4} \times 5$	$10 \times 7\frac{7}{8}$	$10 \times 3\frac{1}{16}$	$7\frac{7}{8} \times 5$	$7\frac{7}{8} \times 3\frac{1}{2}$	$6\frac{3}{8} \times 3\frac{1}{16}$	$5 \times 3\frac{1}{16}$	$3\frac{1}{16} \times 2\frac{1}{2}$
$15\frac{1}{2} \times 5\frac{1}{16}$	$10\frac{1}{8} \times 7\frac{3}{4}$	$10\frac{1}{8} \times 3\frac{7}{8}$	$7\frac{3}{4} \times 5\frac{1}{16}$	$7\frac{1}{4} \times 3\frac{3}{8}$	$6\frac{1}{4} \times 3\frac{7}{8}$	$5\frac{1}{16} \times 3\frac{7}{8}$	$3\frac{7}{8} \times 2\frac{1}{16}$
$17 \times 6\frac{3}{4}$	$13\frac{1}{2} \times 8\frac{1}{2}$	$13\frac{1}{2} \times 4\frac{1}{4}$	$8\frac{1}{2} \times 6\frac{3}{4}$	$8\frac{1}{2} \times 4\frac{1}{2}$	$9 \times 4\frac{1}{4}$	$6\frac{3}{4} \times 4\frac{1}{4}$	$4\frac{1}{4} \times 3\frac{3}{8}$
$13\frac{1}{2} \times 4\frac{1}{4}$	$8\frac{1}{2} \times 6\frac{3}{4}$	$8\frac{1}{2} \times 3\frac{3}{8}$	$6\frac{3}{4} \times 4\frac{1}{4}$	$6\frac{1}{4} \times 2\frac{5}{8}$	$5\frac{3}{8} \times 3\frac{3}{8}$	$4\frac{1}{4} \times 3\frac{3}{8}$	$3\frac{3}{8} \times 2\frac{1}{8}$
$13\frac{1}{4} \times 4\frac{1}{8}$	$8\frac{1}{4} \times 6\frac{5}{8}$	$8\frac{1}{4} \times 3\frac{5}{16}$	$6\frac{5}{8} \times 4\frac{1}{8}$	$6\frac{5}{8} \times 2\frac{3}{4}$	$5\frac{1}{2} \times 3\frac{5}{16}$	$4\frac{1}{8} \times 3\frac{5}{16}$	$3\frac{5}{16} \times 2\frac{1}{16}$

VIII.—Table for Calculating the Areas of Negatives and Prints in Square Inches.

SIZE IN INCHES.															
Nos. of neg- atives.	32 x 24	30 x 24	24 x 17	22 x 20	22 x 18	22 x 16	20 x 18	20 x 15	18 x 16	17 x 14	16 x 13	15 x 12	12 x 10	10 x 8	9 x 7
1	768	720	408	440	396	352	360	300	288	238	208	180	120	80	63
2	1,536	1,440	816	880	792	704	720	600	576	476	416	360	240	160	126
3	2,304	2,160	1,224	1,320	1,188	1,056	1,080	900	864	714	624	540	360	240	189
4	3,072	2,880	1,632	1,760	1,584	1,408	1,440	1,200	1,152	952	832	720	480	320	252
5	3,840	3,600	2,040	2,200	1,980	1,760	1,800	1,500	1,440	1,190	1,040	900	600	400	315
6	4,608	4,320	2,448	2,640	2,376	2,112	2,160	1,800	1,728	1,428	1,248	1,080	720	480	378
7	5,376	5,040	2,856	3,080	2,772	2,464	2,520	2,100	2,016	1,666	1,456	1,260	840	560	441
8	6,144	5,760	3,264	3,520	3,168	2,816	2,880	2,400	2,304	1,904	1,664	1,440	960	640	504
9	6,912	6,480	3,672	3,960	3,564	3,168	3,240	2,700	2,592	2,142	1,872	1,620	1,080	720	567
10	7,680	7,200	4,080	4,400	3,960	3,520	3,600	3,000	2,880	2,380	2,080	1,800	1,200	800	630

IX.—Representative Fractions corresponding to the Scales of Maps published by the Survey of India Department.

Scale.	Representative Fraction.	Scale.	Representative Fraction.
1 Inch = 256 Miles .	$\frac{1}{16,220,160.}$	1 Inch = 2 Miles	$\frac{1}{126,720.}$
1 Inch = 128 Miles .	$\frac{1}{8,110,080.}$	1 Inch = 1 Mile	$\frac{1}{63,360.}$
1 Inch = 96 Miles .	$\frac{1}{6,082,560.}$	2 Inches = 1 Mile	$\frac{1}{31,680.}$
1 Inch = 80 Miles .	$\frac{1}{5,068,800.}$	3 Inches = 1 Mile	$\frac{1}{21,120.}$
1 Inch = 64 Miles .	$\frac{1}{4,055,040.}$	4 Inches = 1 Mile	$\frac{1}{15,840.}$
1 Inch = 50 Miles .	$\frac{1}{3,168,000.}$	5 Inches = 1 Mile	$\frac{1}{12,672.}$
1 Inch = 48 Miles .	$\frac{1}{3,041,280.}$	6 Inches = 1 Mile	$\frac{1}{10,560.}$
1 Inch = 32 Miles .	$\frac{1}{2,027,520.}$	8 Inches = 1 Mile	$\frac{1}{7,920.}$
1 Inch = 24 Miles .	$\frac{1}{1,520,640.}$	10 Inches = 1 Mile	$\frac{1}{6,336.}$
1 Inch = 16 Miles .	$\frac{1}{1,013,760.}$	12 Inches = 1 Mile	$\frac{1}{5,280.}$
1 Inch = 12 Miles .	$\frac{1}{760,320.}$	16 Inches = 1 Mile	$\frac{1}{3,960.}$
1 Inch = 8 Miles .	$\frac{1}{506,880.}$	20 Inches = 1 Mile	$\frac{1}{3,168.}$
1 Inch = 6 Miles .	$\frac{1}{380,160.}$	24 Inches = 1 Mile	$\frac{1}{2,640.}$
1 Inch = 4 Miles .	$\frac{1}{253,440.}$	30 Inches = 1 Mile	$\frac{1}{2,112.}$
Atlas of India .	$\frac{1}{255,561.}$	32 Inches = 1 Mile	$\frac{1}{1,980.}$

11. Representative Fractions corresponding to the Scales of
 Lines published by the Survey of India Department.

Scale	Representative Fraction	Scale	Representative Fraction
1 inch = 1 mile	$\frac{1}{63,360}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 2 miles	$\frac{1}{126,720}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 3 miles	$\frac{1}{190,080}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 4 miles	$\frac{1}{253,440}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 5 miles	$\frac{1}{316,800}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 6 miles	$\frac{1}{380,160}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 7 miles	$\frac{1}{443,520}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 8 miles	$\frac{1}{506,880}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 9 miles	$\frac{1}{570,240}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 10 miles	$\frac{1}{633,600}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 12 miles	$\frac{1}{760,320}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 15 miles	$\frac{1}{942,000}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 20 miles	$\frac{1}{1,256,000}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 25 miles	$\frac{1}{1,570,000}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 30 miles	$\frac{1}{1,884,000}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 40 miles	$\frac{1}{2,512,000}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 50 miles	$\frac{1}{3,140,000}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 60 miles	$\frac{1}{3,768,000}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 70 miles	$\frac{1}{4,396,000}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 80 miles	$\frac{1}{5,024,000}$	1 inch = 1 mile	$\frac{1}{63,360}$
1 inch = 90 miles	$\frac{1}{5,652,000}$	1 inch = 1 mile	$\frac{1}{63,360}$